DOCUMENT RESUME

ED 149 041 08 CE 014 148

TITLE	Developing Performance Objectives and Criterion-Referenced Measures for Performance-Based Instruction in Vocational Education.
INSTITUTION	Alabama State Dept. of Education, Montgomery. Div. of Vocational Education.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C.
PUB DATE	78
NOTE	49p.; Parts may be marginally legible due to print quality
EDRS PRICE	MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS	*Behavioral Objectives; Behavior Standards; Check Lists; *Criterion Referenced Tests; *Guidelines; Guides; Job Analysis; *Job Skills; Performance Based Education; *Task Analysis; Vocational Education; *Writing

ABSTRACT

Designed to provide guidance in the development of performance objectives and criterion-referenced measures, this booklet is intended for teachers, supervisory personnel, teacher trainers, and writers involved in developing performance-based instruction. To show the relationship of performance objectives and criterion-referenced measures to the total process of instructional development, the first chapter presents a model for development, beginning with occupational analysis (which reflects those tasks workers are actually doing on the job). Chapter 2 outlines procedures and guidelines for performing the task analysis (examination of each job task to determine its component behaviors). The writing of performance objectives to specify each desired competency is covered in the third chapter under these topics: rationale, terminology, concept of measurable objectives, rules for specifying behavior, types of conditions, types of standards, determining the number of objectives required for each task, and guidelines for writing. The final step, writing of criterion-referenced measures (for measuring each competency), is detailed in chapter 4, which covers the purpose of criterion-referenced measures, characteristics of good measures, and specific guidelines for development and evaluation. Also included is a chapter on developing evaluation checklists (supplementary aids to the performance objective standards for use when the specified product or process is highly subjective). A final outline of the entire process is included as a guide for edit and review. (JT)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED149041

DEVELOPING PERFORMANCE OBJECTIVES AND CRITERION-REFERENCED MEASURES FOR PERFORMANCE-BASED INSTRUCTION IN VOCATIONAL EDUCATION

BEST COPY AVAILABLE

Wayne Teague
State Superintendent

T. L. Faulkner, Director
Vocational Education

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Division of Vocational Education
Alabama State Department of Education
State Office Building
Montgomery, Alabama 36130

1977 - 1978

CE 014 148

This text is one of the series on developing performance-based instruction. Other areas covered in the series are:

Introduction to Performance-Based Instruction
Occupational Analysis
Structure and Use of Alabama V-TECS Catalogs
Instructional Planning
Selection/Development of Instructional Materials
Validation
Adaptive Instruction
Accountability

This publication is financed by funds provided under the Elementary and Secondary Education Act of 1965 (Title IV, P.L. 89-10 as amended by P.L. 93-380), granted to the Alabama State Department of Education by the U.S. Office of Education, Department of Health, Education, and Welfare. However, the opinions expressed herein do not necessarily reflect the position or policy of the U.S. Office of Education, and no official endorsement by the U.S. Office of Education should be inferred.

It is the official policy of the Alabama State Department of Education, including postsecondary institutions under the control of the State Board of Education, that no person in Alabama shall, on the grounds of race, color, handicap, sex, religion, creed, national origin, or age, be excluded from participating in, be denied the benefits of, or be subject to discrimination under any program, activity, or employment.

TABLE OF CONTENTS

1. **RELATIONSHIP OF OBJECTIVES AND MEASURES TO THE DEVELOPMENT OF PERFORMANCE-BASED INSTRUCTION** 1

A Model For Developing Performance-Based Instruction 2

Relationship of Occupational Analysis to Task Analysis, Performance Objectives and Criterion-Referenced Measures 5

2. **PERFORMING THE TASK ANALYSIS** 7

Procedures for Task Analysis 7

Guidelines for Task Analysis 10

3. **WRITING PERFORMANCE OBJECTIVES** 11

Rationale of Objectives 11

Terminology of Objectives 12

Concept of Performance Objectives 13

Rules for Specifying Behavior 14

Types of Conditions 17

Types of Standards 18

Determining the Number of Objectives Required for Each Task 19

Guidelines for Writing Performance Objectives 20

4. **WRITING CRITERION-REFERENCED MEASURES** 21

Purpose of Criterion-Referenced Measures 21

Characteristics of Criterion-Referenced Measures 22

Guidelines for Development and Evaluation of Criterion-Referenced Measures . . . 22

5. **DEVELOPING EVALUATION CHECKLISTS** 25

The Role of Checklists 29

Standards Not Usually Requiring Checklists 29

When the Checklist Should Be Considered 31

Guidelines for Writing Checklist 43

6. **A GUIDE FOR EDIT AND REVIEW** 45

Task Analysis 45

Performance Objectives 45

Criterion-Referenced Measures 46

Instructor Checklist 46

CHAPTER 1

RELATIONSHIP OF OBJECTIVES AND MEASURES TO THE DEVELOPMENT OF PERFORMANCE-BASED INSTRUCTION

The foundation of performance-based instruction is performance objectives accompanied by criterion-referenced measures. Based on the tasks derived from an occupational analysis, performance objectives prescribe the job competencies in measurable terms and provide the basis for all subsequent development of instruction. Criterion-referenced measures are the instruments for assessing student competencies and for evaluating the effectiveness of the instruction. Designed to provide guidance in the development of performance objectives and criterion-referenced measures, this publication should prove helpful to:

- Teachers who are developing performance objectives and criterion-referenced measures.
- Supervisory personnel who review and edit objectives and measures developed by others.
- Those who need a basic reference applicable to the needs of performance-based instruction in Alabama.
- Personnel conducting inservice teacher training.
- Writing team members developing Alabama V-TECS catalogs.

This publication was written on the assumption that a valid task list derived from an occupational analysis will be used as the basis for developing performance objectives and criterion-referenced measures.

The development of performance-based instruction begins with an occupational analysis which reflects those tasks workers are actually doing on the job. Each of those tasks is then further analyzed to determine its components behaviors, a performance objective is written to specify the desired competency, and a criterion-referenced measure is written to measure that competency. Only when those activities have been completed can effective performance-based instruction be developed.

In order to show the relationship of performance objectives and criterion-referenced measures to the total process of instructional development, this chapter presents a model for development. It also summarizes the relationship of the occupational analysis to the subsequent task analysis and development of performance objectives and criterion-referenced measures.

A MODEL FOR DEVELOPING PERFORMANCE-BASED INSTRUCTION

In order to incorporate the principles of performance-based instruction into a vocational course or program, certain activities must be accomplished. This chart, therefore, presents a general model for development.

Phase 1: Determine Content	Phase 2: Plan for Instruction	Phase 3: Implement Instruction
1.1 Determine occupational tasks	2.1 Develop enabling objectives and measures	3.1 Develop lesson plans
1.2. Analyze tasks	2.2. Specify supporting skills and knowledges	3.2. Select/develop student materials
1.3. Develop performance objectives	2.3. Select methods and media	3.3. Conduct mainstream validation
1.4. Develop criterion-referenced measures	2.4. Plan student activities	3.4. Adapt validated instruction to special needs
1.5. Organize instructional sequence		3.5. Set up system of accountability

The model contains a summary of those activities necessary for complete development of vocational programs. Revision of existing programs will not necessarily require completion of all activities since some might have already been accomplished.

Admittedly, this is not the only model for development of performance-based instruction; there are others with various degrees of detail. But this one, based on the major elements common to most models and tailored toward the curriculum requirements of vocational education, does have certain advantages.

- It is a relatively simple conceptual model which can be helpful in disseminating the techniques of PBI development.
- It outlines the major activities, and becomes a basis for directing and evaluating the key events in program development or revision.
- It provides a frame of reference for each activity.
- It can serve as a guide for planning and scheduling specific inservice training.
- Finally, it can help to maintain consistency and continuity in program development or revision.

PHASE 1. DETERMINE CONTENT

The first phase consists of five major activities, the end product of which is an organized instructional sequence.

1.1 Determine Occupational Tasks. Occupational tasks are derived from research conducted within a specific occupation. Such research involves analyzing each occupation to determine its duties and tasks, surveying large number of workers to determine exactly what they are doing, and then deciding on that basis what should be included in the training. Through such research procedures as on-site observations, interviews, questionnaires, checklists and computer analyses, tasks can be based upon actual job requirements.

1.2 Analyze Tasks. Once the needs of an occupation have been clearly stated in research-based tasks, each task is then further analyzed. This task analysis, conducted through literature study, interviews, observations and other research procedures, is done to determine the major steps and procedures which make up each task as well as the conditions under which it is performed and the equipment it requires.

1.3 Develop Performance Objectives. Each analyzed task is next translated into a performance objective which specifies exactly what the student will do as a result of the instruction, the conditions under which it will be done, and the standard of proficiency to be achieved.

1.4 Develop Criterion-Referenced Measures. For each performance objective, a measure is written which requires the student to perform what is specified in each objective. This criterion-referenced measure enables the instructor to evaluate the student's performance according to the objective's standard. It also provides the instrument for validation of the instruction.

1.5 Organize Instructional Sequence. Since an occupational analysis includes a broad area of duties and tasks, each program must be tailored to meet specific training requirements set up by institutional, regional or local demand. The specific instructional requirements, then, can be selected from the tasks and objectives and arranged into the desired teaching sequence.

PHASE 2. PLAN FOR INSTRUCTION

When the content has been determined, the next phase is to plan for the instruction. Effective performance-based instruction is not something that just happens; it is something that must be carefully and systematically planned. Phase 2, therefore, contains four major activities which may be accomplished independently or simultaneously.

2.1 Develop Enabling Objectives and Measures. For each performance objective included in the instructional sequence there may be short-term, intermediate objectives which prescribe what students will do as they progress toward mastery of each task. Those objectives are called enabling objectives because they prescribe the progressive achievements of one who is learning the task. They become, in a sense, the steps in a learning ladder. Because they prescribe both skills and knowledges, enabling objectives can become a sequenced structure for each segment of instruction. For each enabling objective, a measure is designed to assess its attainment.

2.2 Specify Supporting Skills and Knowledges. While the enabling objectives make up the structural framework for the teaching plans, the skills and knowledges make up the specific informational content. They include the procedural steps which must be explained and demonstrated and the essential knowledges which must be taught.

2.3 Select Methods and Media. For each enabling objective, a method is selected for communicating the skills and knowledges to the students and for managing the learning activities. The term method is used in terms of how teachers can manage and facilitate the communication and activities. Then for each method, the media - such as texts, student materials, audio visuals - are selected.

2.4 Plan Student Activities. As the knowledges and skills are communicated by the methods and media, the students should participate through meaningful experiences or activities. In this way they can learn by doing. The planning, therefore, must include the essential student activities such as routine activities made in response to instruction, practice for developing skills and reinforcing knowledges, performance of enabling objectives, and actual performance of the criterion-referenced measures. Student activities insure active participation.

PHASE 3. IMPLEMENT INSTRUCTION

After the content has been determined and the planning for instruction has been completed, the third phase involves putting the plan into operation. This involves five major activities as follows:

3.1 Develop Lesson Plans. Following the instructional planning worksheets, each instructor can develop specific plans for the lessons. Such lesson plans may include teacher-presented lessons, or planned activities in which students can work and study in a group or in individual assignments.

3.2 Select/Develop Student Materials. The necessary student materials such as texts, manuals, charts, and other items are obtained. Then the necessary teacher-made items - such as assignment sheets, information sheets, worksheets, study guides, exercises and project directions - are prepared for each lesson.

3.3 Conduct Mainstream Validation. When student materials have been made ready, the instruction can then be tried out or validated. This involves teaching the program as planned and evaluating achievement of both the enabling and performance objectives. Validation will reveal any weaknesses in the instruction, and necessary revisions can be made.

3.4 Adapt Validated Instruction to Special Needs. The validated instruction can then be adapted to meet the special needs of the students. This involves tailoring the instruction to meet the needs of slow, fast, disadvantaged, retarded and handicapped, and other special needs students. Adaptation to special needs is undertaken at this late state in the process because the primary content should first be validated. Then all adaptive measures can be based on valid mainstream instructional content.

3.5 Set up System of Accountability. The last activity involves setting up a system of accountability. This involves the record keeping of each student's achievements, the certificate which each student receives at the end of the program, and a method for

evaluation of the instruction. Both records and certificate should reflect what the student has actually achieved instead of the adjective grades which have been assigned. Evaluation should indicate whether the instruction is effective in terms of student achievement.

The PBI model begins with a determination of the occupational tasks and ends with the evaluation of training. Its activities can be applied to the development of new programs or to the updating or revision of existing programs. Appropriate activities can be applied at any point in a program. For example, if a program is found to already have valid content, updating can be done in one of the other phases as required.

RELATION OF OCCUPATIONAL ANALYSIS TO TASK ANALYSIS, PERFORMANCE OBJECTIVES AND CRITERION-REFERENCED MEASURES

The development of performance-based instruction begins with the occupational tasks derived from occupational analysis. Through systematic research procedures, the occupational analysis produces, among other data, a list of the tasks performed on the job. The sample below was extracted from such a list.

C. ACCOMPLISHING PERIODIC ACCOUNTING/REPORTING ACTIVITIES

1. **Foot, prove and rule cash journals**
2. **Open bookkeeping system on new business**
3. **Close ledger accounts**
4. **Prepare post-closing trial balances**
5. **Prepare income statements**
6. **Prepare capital statements**
7. **Prepare report form balance sheets**
8. **Prepare schedules of accounts payable**
9. **Prepare schedules of accounts receivable**
10. **Prepare schedules of cost of goods sold**
11. **Prepare customer's statements of account**
12. **Prepare cycle billing schedules**
13. **Prepare account sales reports**
14. **Prepare statements of cost of goods manufactured**
15. **Prepare sales reports using punch card data**
16. **Prepare invoices for payments due**
17. **Prepare cash disbursement sheets**
18. **Take inventories**
19. **Write checks to pay bills for business**

To begin development of performance-based instruction, each task must be analyzed to determine its elements and procedural steps and the conditions and standards for performance. Each analyzed task is then translated into a performance objective. To the objective is added the criterion-referenced measure. For convenience, task analyses, performance objectives and criterion-referenced measures may be documented on task worksheets. The following sample shows a completed worksheet for the task "Write checks to pay bills for business."

TASK WORKSHEET

TASK: Write checks to pay bills for business

ELEMENTS AND PROCEDURAL STEPS	CONDITIONS STANDARDS
1. Fill in check stub. a. Make sure balance is up-to-date. b. Record deposit. c. Total previous balance. d. Record amount of check. e. Subtract and record new balance. f. Record balance on next check stub.	Student will be given blank checks and written guidelines.
2. Write the check. a. Write check number if not prenumbered. b. Write date on which check is being issued. c. Write the payee's name in full. d. Write amount of check in figures. e. Write amount in words. (1) Begin at extreme left (2) Separate dollars and cents with word "and" (3) Write cents as fraction of 100 (4) Draw line from cents to "Dollars" (5) For amount less than $1, write "only - cents"	Check must be written with no errors.

PERFORMANCE OBJECTIVE:

Provided a blank check for student use and information concerning dates, payee, drawer, amount, previous deposits and balance and check writing guidelines, prepare the check and stub without error.

CRITERION-REFERENCED MEASURE:

Using the checklist in your Task Sheet, the information in the worksheet and the attached blank check, write the check and stub.

This publication deals with those activities shown on the sample worksheet. In addition, it contains a chapter on developing evaluation checklists and one with guidance for editing and reviewing task analyses, performance objectives criterion-referenced measures, and evaluation checklists.

CHAPTER 2

PERFORMING THE TASK ANALYSIS

When the occupational tasks have been determined, it is necessary to analyze each of them. This involves a detailed, systematic analysis of what the worker does when performing each task and includes:

- Major elements of the task.
- Procedural steps for each element.
- Equipment, materials, etc. used in doing the task.
- Other conditions necessary to performance.
- The degree of desired proficiency or standard.

Only when such data have been obtained are you ready to begin writing performance objectives and criterion-referenced measures. This chapter, designed to teach you how to perform the task analysis, includes the following sections:

Procedures for Task Analysis
Guidelines for Task Analysis

PROCEDURES FOR TASK ANALYSIS

A variety of procedures may be used in the task analysis, including:

- Utilization of self-knowledge or background.
- Literature search.
- Interviews.
- Task observation.
- Task surveys.

SELF-KNOWLEDGE OR BACKGROUND

If you are an instructor teaching the occupation, you can make a tentative analysis from your own expertise. But remember: You cannot rely solely on your own background - you must follow up with data either obtained from or verified by other sources.

LITERATURE SEARCH

Through this procedure, you will gather all printed matter available from the tasks being analyzed. Then study this material to determine the elements and steps of performance, the equipment to be used, and information pertaining to conditions and standards.

Usually, the literature search should follow the tentative analysis made from your own knowledge and background. One advantage of this procedure is that each person can work independently in analyzing and interpreting the printed information. A disadvantage is that what is written might not be current. Procedures change with changing teachnologies, and publishers are sometimes slow to bring their written procedures up to date. Therefore, you

must try to use the most current material available. And even then, you should be prepared to follow up the literature findings with other procedures for doing the analysis.

INTERVIEWS

Interviews may be conducted with subject matter specialists or supervisors, incumbent workers and employers.

Subject Matter Specialist Interviews. The subject matter specialist may be an instructor fully qualified in the task under consideration or a supervisor who is likewise fully qualified. It may be a combination of both. The subject matter specialist should provide information that relates to what to teach rather than how to teach it. The subject matter specialist interview can confirm, verify, supplement, clarify or justify the findings from the literature search. As a minimum, you should ask these questions:

- Are the elements and procedural steps correctly identified?
- What major decision points are inherent in the task performance?
- Are the data correct, complete and realistic for a training situation?
- Are the standards acceptable and realistic?
- Are the conditions realistic?

Worker Interviews. In this type of interviews you go straight to the "horse's mouth." Once you have established rapport with the worker, simply ask such questions as:

- What are the elements and procedural steps in this task?
- How is each step performed?
- What are the critical decision points in the task performance?
- What equipment must be used in performing the task?
- What are the criteria for satisfactory performance?
- Are there any critical safety precautions?

Employer Interviews. Often an employer can be interviewed to obtain task analysis data. Remember, however, if the employer is running a large operation, he or she is not likely to have detailed knowledge of each task. Therefore, you should limit the interview to questions about conditions and standards of performance.

TASK OBSERVATION

After conducting interviews, you might find that data from all interviewers do not agree, especially in the elements and procedures. When such differences occur, you should consider another source, the task observation. For task analysis purposes, the task observation should be conducted by watching an expert or competent worker perform the task under actual or closely simulated job conditions. This function is especially useful when you need to establish practical procedures, verify previously documented procedures, acquire first-hand knowledge, or correlate written procedures with actual performance.

Establishment of Practical Procedures. Since many tasks can be performed in a variety of acceptable ways, restricting a procedure to one style or method of performance might result in a stereotyped, limited approach. Therefore, one of the reasons for observing performance is to select ways which can be demonstrated and practiced in the most practical and generally accepted procedure.

Verification of Procedures. The task observation is a useful procedure to verify findings from literature search and interviews with subject matter specialists and instructors, supervisors and workers.

Acquisition of First-Hand Knowledge. Sometimes different impressions can result from reading how something is done and from seeing it done. For that reason, the task observation can give you first-hand knowledge of how a task is performed.

Correlation of Written Directions With Actual Performance. Task observation enables you to reconcile differences between how a procedure is written and how it is actually performed.

Conducting the Task Observation. When conducting a task observation, you should accomplish the following:

- *List each step performed*. Do not assume or anticipate anything. There may be specific reasons for each act which are not obvious to the observer; therefore each step should be listed.
- *Indicate the sequence*. If the steps must be performed in a particular sequence, indicate that sequence.
- *Indicate any decision points*. If decisions must be made during performance of the task, identify them. Include the alternatives which must be provided.
- *Write descriptions and explanations*. Include a brief description and explanation of each step performed as follows:
  - State how it is done.
  - Include the use of all equipment
- *Question the performers*. Questions should only be asked after you have observed the entire task. The following questions should be included:
  - Why is each step performed?
  - When should decisions be made?
  - What contingencies must be considered?
- *Note any safety precautions*.

TASK SURVEYS

You may verify or validate your findings with a survey. When properly used, a survey can provide valuable information concerning the task analysis. Basically, there are three types of task surveys.

- *Questionnaires*. Prepare the findings on a completed set of analyses and send them out to selected workers and other experts. Ask them to respond in terms of the accuracy and completeness of the analyses.
- *Group Interviews*. When several workers can be brought together, it is sometimes possible to obtain feedback from the respondents as a group.
- *Individual Interviews*. It is sometimes possible to obtain feedback on task analyses by interviewing individual workers.

GUIDELINES FOR TASK ANALYSIS

Using the data you have obtained through the previous methods, complete the task analysis as follows:

1. Organize the steps of task performance into major steps. A major step is a meaningful element of the task and has these characteristics:
   - It represents a logical step of progression toward total task performance.
   - It embodies a sequential set of skills as substeps.
   - It can be explained, demonstrated, performed and evaluated as a meaningful task component.
   - The sum total of the steps should equal the task performance.
2. Arrange the major steps in the job order sequence.
3. Under each major step enter the substeps which make up the procedure.
4. Enter any information pertaining to conditions, standards and any other pertinent information.
5. Use as many of the research procedures that are necessary to obtain valid analyses.

CHAPTER 3

WRITING PERFORMANCE OBJECTIVES

When you have completed the task analyses, you are ready to write the performance objectives. This chapter is designed to help you do this. It includes:

Rationale of Objectives
Terminology of Objectives
Concept of Measurable Objectives
Rules for Specifying Behavior
Types of Conditions
Types of Standards
Determining the Number of Objectives Required for Each Task
Guidelines for Writing Performance Objectives

RATIONALE OF OBJECTIVES

OBJECTIVES AND LEARNING

Learning itself cannot be directly observed, but it can be inferred through observations of how a student performs after instruction in comparison with how (s)he behaved before instruction. The person who has learned something is somehow different from the person (s)he was before learning took place. Since instruction is intended to change behavior, the objectives should describe the changed behavior which is sought. An objective which describes changed behavior is a precise statement that answers the question: What must students do to show they have learned what was expected? For the statement to be understood in the same way by all who work with it, it must also include the minimum standard of performance or proficiency expected, and the conditions under which the behavior is to be exhibited.

PURPOSES OF OBJECTIVES

Objectives provide the basis for all the remaining activities in the development of performance-based instruction. Some of their more important uses are:

- Provide the framework upon which to build teaching content. The content of instruction is the collection of knowledges and skills that must be taught. Objectives, therefore, help to structure curriculum.
- Provide a basis for the selection of the most effective instructional methods, design, and media.
- Establish clear-cut instructor and student goals. Through objectives, both the instructor and the student know precisely what is required of the student.
- Provide basis for criterion-referenced measurement. Because student achievement in observable behavior is specified, objectives dictate the construction of tests designed to measure student achievement.
- Provide a basis for validation. Validation is a process used to check the effectiveness of the instruction. Effectiveness is determined by whether the students pass or fail objectives.

TERMINOLOGY OF OBJECTIVES

This section establishes the terminology used in this text and defines several other terms you are likely to encounter in other publications.

TERMINOLOGY USED IN THIS TEXT

It is convenient for all concerned to use standard terminology. Therefore, we shall use the term **performance objective**. This is a behavioral statement of the task performance which specifies exactly what the student must do, the condition under which it will be done, and the standard by which it can be evaluated. We shall be concerned with **performance objectives, those which prescribe task performance.**

OTHER TERMS

Learning or Instructional Goals. The intent of education or instruction is sometimes expressed as goals. For example, "Be able to troubleshoot," "Develop an appreciation of safety rules," "Have an acceptable understanding of Ohm's law." Such goals are not objectives and are not intended to be–they do not describe student achievement in measurable terms.

Learning Objectives. This term is often used in a general sense to include different types of objectives. It is used primarily to designate objectives that are achieved in training as opposed to others that might be accomplished on the job.

Behavioral Objectives. This term refers to statements of desired student achievement. Such statements contain operational descriptions of the desired behaviors. An educational goal might read "Understand Ohm's law" but it does not describe the desired behavior in operational terms. A behavioral objective, on the other hand, might **describe** the behavior as "Given 20 problems, the student will compute unknown current, resistance, and voltage without error."

Criterion Objective. This sometimes means the same as performance objective. It seems to be preferred by those who emphasize the assessment of performance against a standard, hence the term "criterion."

Subobjectives.- refers to lower order objectives which support one broader objective. It is usually based on elements of a task or units of supporting knowledges.

Task Objective - prescribes performance of a task or part of a task.

Primary Objective - used mainly to designate the first order in a given hierarchy.

Terminal Objective - used to indicate an objective to be achieved as an end result-end of unit, end of block, etc.

Supporting Objective - used during the instruction to support end-result objectives.

Secondary Objective - often used to designate lower order objectives when those of the first order are called primary objectives.

Intermediate Objective - used to designate lower order objectives when those of the first order are called terminal objectives.

Enabling Objective - used to refer to any lower order of objectives or to a higher order objective which supports others of the same order.

Common Element Objective - used to refer to objectives of any order when they are common to several tasks. A good example of this might be a task involving use of common handtools. Usually, common element objectives are taught first.

CONCEPT OF PERFORMANCE OBJECTIVES

There are three components in a performance objective: the behavior the students are expected to perform, the conditions under which they will perform, and the acceptable standard by which their performance will be evaluated.

BEHAVIOR

The first component is the statement of behavior. This is a statement of what students will do while in training to show that they have learned a specific task or knowledge. The statement must be written in measurable, observable terms. This means that the students must do something which can be objectively evaluated. Consider these examples:

- ... convert English measurements to metric measurements...
- ... mill internal slots using slotting attachment...
- ... remove cuffs...
- ... prepare a Tax Warranty Register...

These examples state behaviors which can be observed and measured, and are therefore acceptable as behavior components of performance objectives.

CONDITIONS

In order for each student's behavior to be observed and measured or evaluate, it should occur under constant, controlled conditions. In other words, if there are 30 students in a class, each of them must perform the behavior under **controlled** conditions. Another component, therefore, must be added to the objective to specify those controlled conditions. Specifications include the tools, equipment, materials, references, or any other special provisions which affect the student's performance when accomplishing the objective.

In the example below, the conditions have been added to the behavior components. For illustrative purposes, conditions are underlined with one line, behaviors are underlined with two lines.

- Provided with English system linear measurement, job specifications, and refernece book, convert English measurements to metric measurements...
- Given blueprints, workpiece, work-holding device, vertical mill with accessories, slotter attachment, slotter cutter or tool, and precision instruments, mill internal slot using slotter attachment...

- Provided a pair of slacks with fold-up cuffs and necessary equipment, remove cuff...
- Using five unpaid tax bills, appropriate tax records for previous years and a current Error and Insolvency list, prepare a Tax Warranty Register...

STANDARD

As you have seen, the behavior specifies, in action verbs, exactly what the students will do, and the condition specifies what will be given or denied when they do it. In order to complete the performance objective, we must add a third component - the standard.

In a performance objective, the standard specifies the degree of accuracy or proficiency the students must achieve when they perform the behavior under the specified conditions. Without a standard it is impossible to determine when they have met the objective. To illustrate how standards are added, let's consider the examples already used -- this time with standards which are underlined with three lines.

- Provided with English system linear measurement job specifications and reference book, covert English measurements to metric measurements to table or chart accuracy.
- Given blueprint, workpiece, work-holding device, vertical mill with accessories, slotting attachment, slotting cutter or tool, and precision measurement instruments, mill internal slot using slotter attachment to blueprint specifications to a tolerance of $\frac{+0.010"}{-0.000}$
- Provided a pair of slacks with fold-up cuffs and necessary equipment and supplies, remove cuff. There must be no sign of alteration on outside.
- Using five unpaid tax bills, appropriate tax records for previous years and a current Error and Insolvency list, prepare a Tax Warrant Register without error.

RULES FOR SPECIFYING BEHAVIOR

There are two rules which apply to the specification of behavior:

- Use action verbs which communicate measurable, observable performance.
- Qualify the behavior when necessary.

USE ACTION VERBS TO COMMUNICATE MEASURABLE, OBSERVABLE PERFORMANCE

In order to understand the importance of specific performance statements, it is helpful to compare statements of educational goals with operational statement of student behavior.

In the past, many have used statements to communicate the intent of a course or program. Even though such statements were sometimes called objectives, actually they were goals expressed in broad, general statements which were not really measurable and observable. For example:

"The student will understand ...."
"The student will know ...."
"The student will become familiar with ...."
"The student will appreciate ...."

Such statements do not communicate measurable, observable student behavior. Although they express in general, abstract terms a desired change of behavior, they do not specify what the student will do to demonstrate that a change in behavior has occurred. For example, if you write "The student will understand the metric system," you merely express the intent of the instruction. A measurable objective must specify what the students will do to prove that the desired change in behavior has been accomplished. How could students demonstrate that they "understand" the metric system? To answer that question, consider the following hypothetical situation.

Imagine that you must teach your students to "understand" the metric system. Hopefully, the instruction will, in fact, teach the students to the degree that they understand it. But how can you describe a student activity or a performance that can be observed and measured–one in which the students can demonstrate that they understand? What can students who understand the metric system do to prove beyond a doubt that they understand it? And how can you prescribe that performance in behavioral terms? If, after your instruction, your students could convert English measurements to metric measurements, you would have proof of their changed behavior.

Therefore to specify measurable, observable behavior, you should state in action terms what students are expected to do. Use action verbs such as the following:

Covert	Inspect	Remove	Make
Assemble	Prepare	Build	Adjust
Troubleshoot	Label	Select	Match
Trace	Write		

Some examples of what you should not use are:

"Have a knowledge of –"
"Demonstrate a working knowledge of –"
"Become thoroughly familiar with –"
"Understand –"
"Develop an appreciation for –"
"Become oriented to –"

QUALIFY THE ACTION VERB(S) FOR A COMPLETE SPECIFICATION

You must start by selecting an action verb that communicates a behavior that can be observed and measured. But the action word alone does not always provide a complete specification. For that reason we sometimes must add one or two other elements, depending upon the behavior. So let's consider these rules:

1. The action verb must be accompanied by an object. The action verb itself answers the first question, "Do what?" But there is another question that must be answered, "To what?" Consider this example:

...Remove cuff...
Do what? Remove. (action verb)
To what? Cuff (object)

When we combine the two, we have a more complete specification. Here are some examples of the combined action verbs and objects.

ACTION VERBS	OBJECTS
Inspect	**electrical system**
Replace	**fuses**
Change	**tire**
Label	**components**

These statements communicate what will be done to what. Remember: Your action verb must usually be accompanied by an object.

2. For many behaviors, you must add a third element to make the specification complete. In some cases, the first two questions lead to a third – "With what, with what results, to what degree, for what end product?"

Let's consider some examples:

Do what?	To what?
Mill	**internal slots** *using slotter attachment.* **(With what?)**
Convert	**English measurements** *to metric measurements.* **(With what result?)**
Inspect	**ignition system** *for damaged wires.* **(To what degree?)**
Troubleshoot	**circuits** *to isolate malfunctions.* **(For what end product?)**

Whenever necessary, you must add this third element to fully describe the behavior. However, one caution is in order: "Write your objective so that it does not communicate multiple behaviors. Here are some common examples of the wrong and right ways to describe behaviors.

WRONG	RIGHT
Remove cuff and explain the process.	**Remove cuff**
Solve problems to compute interest rates and explain rules	**Solve problems to compute interest rate**
Troubleshoot circuits and isolate malfunction.	**Troubleshoot circuits to isolate malfunction**

If you have more than one behavior in the first element (inspect and repair, assemble and disassemble, label and match, etc) then the behavior should be specified in two or more objectives.

TYPES OF CONDITIONS

There are several types of conditions. Those most generally used are:

Simulated or real-life situation
Equipment
Procedural aids
References
Unusual environmental conditions

Normally, your objectives will contain one or more of these types of conditions.

SIMULATED OR REAL-LIFE SITUATIONS

If you remember that objectives specify what the students will do during instruction in a training situation, then you will realize that the real-life performance is not always possible in the course. For example, in Health Occupation courses, it is not always possible to have a real patient on which to practice such tasks as measuring blood pressure. In order to practice, there must be simualtion - students assume the role of patient. In writing your objective, you should make it clear wheather the students will be working with simulations or in real-life situations. Otherwise, some objectives might be impossible to achieve.

EQUIPMENT

Another important condition that applies to many objectives is equipment such as machines, special tools or devices the student must use when he or she performs the objective. If it is commonly understood that certain tools will be used, it may not be necessary to specify them. But in many cases, special tools or equipment are required and should be specified as a condition.

EXAMPLE: **"Given a 6RBL testing meter..."**
"Given toolkit 12-1..."
"Given a blank check..."
"Given a calculator..."

PROCEDURAL AIDS

There are many tasks which require the student to follow procedural aids. One example of such aids is a checklist. Some of the tasks in your course might require the appropriate checklist. Hence, an objective might read, "Using checklist..." or "Given checklist..."

REFERENCES

There are some tasks which cannot be performed from memory. Consequently, the student, like the person on the job, must use a reference. So if the task or activity requires

direction from a manual or other publication then your objectives must include it as a reference. Example: "...using manufacturer's manual..."

OTHER ENVIRONMENTAL CONDITIONS

Sometimes the students can be provided the actual equipment but must use it in an environment or situation different from that encountered on the job. For example, on the job a certain component is repaired in the automobile, but in the training situation it must be repaired on a workbench. Another example would be to require the students to park a car on concrete, but in real-life the car might have to be parked in snow, ice, mud or on concrete. You should always specify any environmental conditions in the training situation, making sure they represent job conditions as clearly as possible.

TYPES OF STANDARDS

There are several common types of standards such as degree of accuracy, quality of the finished product, content of finished product, time limits, adjunct standards, and those without error.

DEGREE OF ACCURACY

For many objectives, the standard can be specified as degree of accuracy. Here are some examples:

....to a tolerance of plus or minus 1 degree.
....to solve at least 18 of 21 problems correctly.

QUALITY OF FINISHED PRODUCT

When the student performance results in a finished product, a description of the finished product can sometimes be the standard. Some examples:

....adjustment must produce a meter reading of "O".
....the engine must run smoothly at 4500 rpm.
....all panels must light up when the main switch is turned on.
....no sign of alteration on outisde.

CONTENT OF FINISHED PRODUCT

For some performances, the standard may be the content of the finished product. For example:

- **Given results of a task analysis, write a performance objective to include behavior, conditions, and standard.**
- **Given a typical management problem, write a report to include at least three recommended solutions.**

TIME LIMITS

For certain tasks, a time limit may be included as the standard. For example:

- **Given a car parked on concrete and tire changing tools, change a tire within 10 minutes.**
- **Provided dissassembled components of a BR42 carburetor, assemble the carburetor within 45 minutes.**

ADJUNCT STANDARD

For many performances, there are written standards or procedures which may be used as the standard. An example is: "...sparkplug gap must be in accordance with those in manufacturer's manual." CAUTION: Make sure the written source does set a standard, instead of merely giving directions for a procedure.

WITHOUT ERROR

Occasionally, you will encounter a task performance for which errors are not permitted, even in a training situation. In such cases, the standard is simple stated as "without error" or "no errors permitted."

DETERMINING THE NUMBER OF OBJECTIVES REQUIRED FOR EACH TASK

Having considered the components of performance objectives, the rules for specifying behavior, the types of conditions, and the types of standards, you should also consider how to determine the number of objectives required for each task. When you understand this, you will avoid writing objectives so general that the performance becomes unmanageable in a training situation and writing objectives so specific that they do not represent task performance.

ONE PERFORMANCE OBJECTIVE PER TASK

You should consider one performance objective per task when:

- The task statement contains a single behavior.
- The task performance is not too time-consuming or difficult to manage.
- The task does not contain difficult or complex elements.

MORE THAN ONE PERFORMANCE OBJECTIVE PER TASK

You should have more than one objective when any one of the following applies:

- The task can be divided into subtasks. When there are dual behaviors, such as "Remove and replace," "Disassemble and assemble," or "Inspect and repair," the task should be divided into subtasks. Then you should plan to write one objective for each subtask.
- When there are no subtasks, but the task is complicated or time-consuming.

GUIDELINES FOR WRITING PERFORMANCE OBJECTIVES

GENERAL GUIDELINES

- Assemble all of your completed task worksheets so that you can use them as your working documents.
- Determine how many performance objectives you need for each task. Usually, only one is required if the task has been carefully written.
- Using the task worksheets, develop your performance objectives.

STATING BEHAVIOR

Following the performance indicated on each task worksheet, consider each statement of behavior you write to insure that it complies with the following:

- Stated behavior must be observable.
- The behavior as stated must be measurable.
- It must not leave room for different interpretations.

WRITING CONDITIONS

In addition to the previous rules on writing conditions, you should also insure the following:

- Each stated condition matches the job as closely as possible.
- Each stated condition is as realistic as possible.
- Application of the conditions is within manageable limits. If, for example, you write "Given vehicles with inoperative transmissions..." would that be possible during the training?

WRITING STANDARDS

- Make sure each standard conforms as closely as possible to the proficiency required by the job.
- Write a standard that is attainable.
- Write a standard that can be clearly understood by all raters.
- Write a standard that will clearly indicate student achievement on a pass/fail basis.
- Whenever possible, develop a standard based on the quality of the product.

CHAPTER 4

WRITING CRITERION-REFERENCED MEASURES

When you have written the performance objective for each task, your next step is to write the criterion-referenced measure. This chapter is designed to help you do this. It includes the purpose of criterion-referenced measures, characteristics of good measures, and some specific guidelines for development and evaluation.

PURPOSE OF CRITERION-REFERENCED MEASURES

A criterion-referenced measure is the test for the performance objective, stated as specific direction to the student for what to do. Each criterion-referenced measure is based solely on the requirements specified in the performance objective. Thus, an appropriate measure for the objective "Parallel park a car between two other cars without bumping either car" would be to require the student to actually parallel park the car. Multiple-choice questions about parallel parking would not be a true measure of the objective. Neither would having the student explain how to park be a true measure. The student must do exactly what the performance objective specifies. Criterion-referenced measures serve important purposes in performance-based instruction, among which are the following.

STUDENT PROGRESS AND ACHIEVEMENT

Because criterion-referenced measures require performance of the objectives, they are the primary tools for evaluating student progress and achievement. In performance-based instruction, as you recall, students learn by doing. They are also measured on what they do, not on how well they can verbalize or answer questions.

VALIDATION

One of the major activities in the development of performance-based instruction is validation. Whereas conventional instruction gives tests to students to determine if they have "learned", in performance-based instruction the students are measured to determine whether the instruction has **taught** them effectively. If they have learned, as evidenced by satisfactory attainment of specified objectives, the instruction is valid. The same criterion-referenced measures which are used to measure student achievement of the objectives are also used to measure the effectiveness of the instruction.

PROFICIENCY ADVANCEMENT

Some students entering training can already do certain tasks. Criterion-referneced measures, therefore, can be administered before instruction. As a result, students can be advanced beyond those tasks in which they are already proficient. Otherwise, it would be a waste of time to train them in what they already can do.

CHARACTERISTICS OF CRITERION-REFERENCED MEASURES

Criterion-referenced measures must have the following characteristics: realiability, validity, objectivity and comprehensiveness.

REALIABILITY

Reliability means that a measure yields constant results. If a measure is reliable, students who have learned to do a task will pass, and those who have not will fail.

VALIDITY

A criterion-referenced measure is valid when it actually measures what it is supposed to measure and nothing else. Consider the following example. The objective requires the students to type a letter. After an explanation and a demonstration, the instructor administered a ten-item written test. The measure was not valid because the student's ability to type letters was not checked.

OBJECTIVITY

Objectivity is reached in a measure when the teacher's bias or personal opinion is not reflected in evaluation of the student's performance, thus, several teachers rating the same student would all rate the same with a criterion-referenced measure.

COMPREHENSIVENESS

This characteristic in a criterion-referenced measure refers to the measurement of all behavior in a task, not just a sampling.

GUIDELINES FOR DEVELOPMENT AND EVALUATION OF CRITERION-REFERENCED MEASURES

The following guidelines will help you to write criterion-referenced measures and to evaluate those written by others.

1. The criterion-referenced measure should require performance of the same behavior as specified in the objective. Consider the following example.

Performance Objective:

Given five parcels to be weighed for mailing and the required postal regulations, prepare the parcels for mailing to include wrapping, tieing, labeling, weighing, and determinimg the correct postage for each in accordance with the postal regulations.

Criterion-referenced Measure:

Referring to the postal regulations, determine the postage for each of the following:

a. 13 oz. 1st class_____
b. 2 lbs. 4th class_____
c. 16 oz. 1st class_____

In this example, the performance objective specified one behavior; the criterion-referenced measure required a different one. That measure, therefore, is not acceptable because it does not require the same behavior. A criterion-referenced measure of the same behavior would read as follows:

Obtain five packages to be mailed from your instructor. Then prepare each package for mailing to include wrapping, tieing, labeling, weighing and writing the correct amount of postage on each package. You may refer to the postal regulations.

2. **The criterion-referenced measure must test all of the behavior specified in the objective.** Referring to our previous example, suppose it read "Wrap the five packages." It would be unacceptable because it measures only part of the performance objective.

3. **The terminology in the criterion-referenced measure should be compatible with that in the performance objective.** For example, if the objective specifies "...type a business letter...", the measure should also direct the student to "....type a business letter....", not "....write a letter...." or "....prepare a business letter....".

4. **The criterion-referenced measure must require the same conditions as those specified in the performance objective.** In our previous example, postal regulations were included in the conditions. But if a criterion- referenced measure directed the student to "....use the notes you made in class...." or "....work from memory...." that measure would not be true to the objective because conditions were changed. The same conditions must be required in the criterion-reference measure.

5. **Do not merely copy the performance objective to use as a criterion-referenced measure.** The performance objective is a behavioral specification of the task performance; the criterion-referenced measure is a statement telling the student to do the task.

6. **Do not repeat the task analysis in the criterion-referenced measure.** The task analysis outlines the major steps in the task. If some kind of procedural guide (checklist, task sheet, chart, etc) is included as a condition, then simply tell the student to use it.

CHAPTER 5

DEVELOPING EVALUATION CHECKLISTS

Checklists are supplementary aids to the performance objective standards, and may be used when the specified product or process is highly subjective. They should be used **only** when absolutely necessary because of the administrative burden they place on the teacher.

For convenience, checklists are usually page size forms containing the elements illustrated on the cut-a-way below.

INSTRUCTOR CHECKLIST

ACTIVITY	RATING	
	Acceptable	Unacceptable

Some examples of such checklists are on the following pages.

INSTRUCTOR CHECKLIST

Edit and review correspondence and reports

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Corrected grammatical errors.		
2. Corrected punctuation errors.		
3. Did not change content meaning.		
4. Used consistent format.		
5. Used writing style compatible with employer's preference.		
6. Used clear and concise wording in revision of material.		

INSTRUCTOR CHECKLIST Remove excess currency from teller's window

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Removed $500 from cash drawer.		
2. Listed $500 on adding machine.		
3. Separated bills by denomination.		
4. Placed rubber bands around each denomination.		
5. Placed proper denominations in buggy.		
6. Strapped proper denomination.		
7. Retained adding machine tape for balancing records.		

INSTRUCTOR CHECKLIST Assign work to others

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Displayed courteous and pleasant manner.		
2. Showed good judgment.		
3. Gave oral instructions clearly.		
4. Wrote instructions clearly.		
5. Motivated people.		
6. Exhibited self-confidence.		
7. Displayed fairness.		
8. Gave constructive criticism.		
9. Saw that work was completed.		

THE ROLE OF CHECKLISTS

As a practical matter, checklists should be used only when you are unable to briefly spell out the standard in the statement of the objective. Otherwise, you may find yourself preparing checklists defining activities which really do not matter. Furthermore, the instructors who use the objective might be overwhelmed in administering the paperwork. To decide on the use of checklists, it is necessary to consider those standards which **do not** require checklists and those which **do** require them.

STANDARDS NOT USUALLY REQUIRING CHECKLISTS

QUALITY OF FINISHED PRODUCT

For most objectives which result in a finished product, the primary concern is quality. If you are careful to include a description of the minimum required quality, that description should become the standard. Consider the following example.

> Given a late model car, oil, and oil changing equipment, change the oil. **There must be no spillage of oil on auto or floor, and the dipstick must indicate "full" upon completion.**

In this standard the quality has been so described that it can be clearly observed. Therefore, no checklist is necessary.

CORRECTNESS OF FINISHED PRODUCT

Sometimes an objective can be so written that the standard clearly establishes the correct, acceptable product. Consider this example.

> Use a deck of punched cards, a prewired control panel, and a reproducer, operate the reproducer to produce a second deck **that is identical to the source deck.**

In this example, the product is a second deck of punched cards. That product, to be correct, must be identical to the source deck. **This standard can be clearly and objectively observed so that no checklist for evaluation would be desired.**

ACCURACY OF FINISHED PRODUCT

In some objectives, the finished product can be described in terms of accuracy. Here are some examples.

- Given a deck of cards with an alphabetical field to be sorted and a sorter, operate the sorter to produce an alphabetical sorting. **All cards must be in alphabetical sequence.**
- Given a 3' section of copper tubing ¼" in diameter and a spring bender, bend 6" of the tubing to an angle of 90°. **Bend must be within + or - 5°.**
- Given an electric typewriter and draft of a one-page business letter, type the letter **with no more than three typographical errors.**

In the previous examples, the accuracy can be objectively determined; checklist would add nothing to evaluation.

CONTENT OF FINISHED PRODUCT

Some products require minimum content. Here are some examples:

- Given information pertaining to a telephone call for a person absent at the time of the call and a memo pad, prepare a memo of the call. **Memo must include date and time, caller, person called for, and a summary of the message.**
- Given a preprinted blank check and information on a required payment, write a check. **The check must contain date, payee, and amount of payment.**

Since the content clearly establishes an observable standard, no checklist would be required.

ADJUNCT STANDARDS

In some cases, the standard must be made in terms of a previously published set of specifications. Such published standards can be called adjunct in the sense that they can be used with the objective. For example, a student wiring a control panel could best be evaluated by using the wiring diagram. A student computing postage for packages and letters could best be evaluated with the postage rate charts. A student setting the gap on ignition points could best be evaluated with the manufacturer's specifications for the specific car. Consider these examples.

- Provided an unwired control panel, supply of wire and a wiring diagram, wire the control panel **in accordance with the wiring diagram.**
- Given an assortment of packages and letters to be mailed, the weight of each, and a postal rate chart, compute the correct postage for each **in accordance with the postal rate charts.**
- Given an engine with distributor and ignition points installed and a feeler gauge, adjust the gap to the correct setting **in accordance with the manufacturer's specifications.**

In the above example, the adjunct standard can be used so that checklists would neither be necessary nor desirable.

TIME LIMITS FOR COMPLETION OF PRODUCT

On rare occasions, it will be necessary to impose a time limit for completion of the product. One example is typing in which a certain speed is a job requirement. Thus an objective containing this type of standard might read:

Given an electric typewriter and a draft of 400 words, type an error free copy **within 10 minutes.**

Time limits, as pointed out above, are rarely used. When they are used, they are often used along with other standards.

COMBINATIONS

Obviously, any given objective could contain any combination of the above standards without requiring a checklist.

WHEN THE USE OF CHECKLISTS SHOULD BE CONSIDERED

In the previous discussion on standards not requiring checklist, we have been concerned with products. Now we shall consider processes which might require checklists. We shall also consider the conditions under which products might also require checklists.

PROCESSES

Many tasks in vocational education result in meaningful products such as something replaced, put together, repaired, calibrated or made. There are some tasks, however, which do not result in completed products which can be observed on the basis of content, quality, accuracy, and the other standards. Those tasks are more likely to result in a meaningful service, job-relevant decision or a recommended solution to a problem. In evaluating such tasks, the critical elements of performance are steps of the process itself. Here, then, are some guidelines for using checklists.

- **Acceptable Service Depends Upon a Series of Equally Important Steps or Acts.** To illustrate this type, let's consider an objective for bank teller students based on the task "Process counterfeit money." Careful analysis reveals that this does not result in a product but a service. Furthermore, successful rendering of the service depends upon the accomplishment of equally important steps. The objective might read:

  Given a sample counterfeit bill, a blank receipt, and a case description, process the counterfeit bill. All items on the evaluation checklist must be performed correctly.

A checklist such as the following could then be developed.

32

INSTRUCTOR CHECKLIST Process counterfeit currency

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Wrote "counterfeit" across face of bill.		
2. Recorded:		
a. Customer's name and address.		
b. How bill came into customer's possession.		
c. Serial number of bill.		
3. Transferred bill and information to cashier or immediate supervisor.		
4. Wrote note to customer stating location of bill.		
5. Made receipt for amount of bill.		
6. Gave receipt to customer.		

• **Acceptable Performance Depends Upon Quality of Steps in the Process.** Sometimes acceptable performance of a task depends not only upon the doing of certain steps but also upon the how well or quality of each step. Often this type of task involves important aspects of human relations or communication-related elements.

First, consider the human relations aspect. In writing an objective for the bank teller task "Make change for customer," the instructors decided that the teller must do more than "Make correct change", she must render that service in such a way as to promote good will. They then write the following objective:

> **Given a simulated teller window, assortment of bills and coins for change, make the correct change as requested by a "customer" in accordance with the instructor's checklist.**

The checklist was then designed to evaluate the performance as in this example.

INSTRUCTOR CHECKLIST Make change for customers

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Greeted customer with: a. "Good morning/Good afternoon." b. "May I help you?"		
2. Made correct change.		
3. Allowed time for customer to count change.		
4. Thanked customer.		
5. Invited customer to come back.		
6. Did not lower window in customer's face.		

Next, let's consider a process involving communications. In developing an objective for the task "Present briefings" the instructors first decided that a briefing could be evaluated on its content: Introduction, overview, body and summary. But they also decided that **how** the briefing is delivered is even more important. So they included that also in their objective:

> **Given information to be disseminated in a briefing and an audience, present a briefing of 5-10 minutes. Briefing must contain introduction, overview, body and summary and be delivered in accordance with the instructor's checklist.**

The following checklist was then designed.

INSTRUCTOR CHECKLIST Present briefing

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Presentation was organized into introduction, overview, body, and summary.		
2. Voice was audible and clear.		
3. Varied volume.		
4. Varied tones.		
5. Used proper diction.		
6. Avoided slang or colloquialism.		
7. Maintained eye contact with audience.		
8. Avoided distracting mannerisms.		
9. Etc.		
10. Etc.		

CHECKLIST FOR PRODUCTS

Ideally, the finished product should be so described in the standard that an objective evaluation can be readily made. However, there are conditions under which a checklist should be used with the product: when the steps of the performance are critical, when the product of each step must be evaluated, and when the process involves safety precautions.

• **Critical Steps of Performance.** In some cases, the correct performance of each step is critical to the extent that incorrect performance of any one step could jeopardize the finished product. Consider this task for the x-ray student: "Make routine chest x-rays". Upon initial analysis the instructors decided upon this objective:

> **Given a patient, x-ray unit with upright cassette holder, cassette, caliphers and techniques chart, make a chest x-ray that is centered on the film and of readable density and contrast.**

Further analysis, however, revealed certain critical elements, any one of which could cause an unsatisfactory film. To the above objective they added a checklist standard. Then they designed the following checklist.

INSTRUCTOR CHECKLIST

Make routine chest x-ray

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Control panel was turned on to allow warm-up.		
2. Patient was instructed to put on gown after removal of upper clothing and opaque item from chest area.		
3. Patient was measured and radiographic technique determined accordingly.		
4. Patient was properly positioned after cassett was inserted in holder.		
5. Patient was given proper breathing instructions.		
6. No other person was permitted in room during exposure.		

• **Products of Performance Steps.** Sometimes a task can best be evaluated by checking the product of each major step. The following example illustrates this requirement.

Task: **Plant tree**

Performance Objective: **Given a small citrus fruit tree of any variety, spade and water, plant the tree in accordance with the instructor's checklist.**

INSTRUCTOR CHECKLIST

Plant trees

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Hole was prepared according to depth chart.		
2. Roots were fully extended.		
3. Hole around tree was uniformly filled.		
4. Tree was moderately watered.		

• **Critical Safety Feature.** Some tasks are so potentially dangerous that damages could occur to equipment or personnel or both. In such cases it is wise to design a checklist to rate observance of the safety precautions. The following is an example.

Task: **Change wheels**

Performance Objective: **Given a car parked on concrete, spare wheel and tire, and necessary tools, remove and replace a designated wheel in accordance with the instructor's checklist.**

INSTRUCTOR CHECKLIST

Change Wheels

ACTIVITY	RATING	
	Acceptable	Unacceptable
1. Unaffected wheels were blocked front and rear.		
2. Emergency brakes were applied.		
3. Jack was correctly positioned.		
4. Lugs were loosened before wheel was completely raise.		
5. Lugs and replacement wheel were sufficiently secured.		
6. Removed wheel and tools were returned to appropriate place in trunk of car.		

GUIDELINES FOR WRITING CHECKLIST

Following are some specific guidelines to help you write instructor checklists when they can be justified as part or all of the standard.

GENERAL RULE

Do not copy the task analysis for use as a checklist. The performance guide contains all major steps and substeps required for performance of the task. Checklists should address only those elements requiring observations and evaluation.

FOR PROCESSES

- Determine the critical element which must be rated.
- Write each element into a past tense statement so that the rater can make a **did/did not** observation. Example: "Greeted customer with 'Good morning/ Good afternoon.' May I help you."

FOR PRODUCTS

- Determine the critical steps which must be rated.
- For each critical step write a complete past tense statement. Example: "Gave proper breathing instructions to patient."
- For each major step product write a past tense statement describing the product. Example: Roots were fully extended."
- For each critical safety precaution write a past tense statement. Example: "Emergency brakes were applied."

CHAPTER 6

A GUIDE FOR EDIT AND REVIEW

As you develop the task analysis, performance objectives, criterion-referenced measures and instructor checklists, the following will serve as a guide for editing and reviewing them.

TASK ANALYSIS

MAJOR STEPS OR ELEMENTS

1. Do the major steps represent the meaningful elements into which the task can be divided?
2. Does each step:
   a. Represent a logical step of progression toward task performance?
   b. Embody a sequential set of skills or substeps?
3. Can each step be exlained, demonstrated, performed and evaluated as a meaningful increment?
4. Is each major step stated in action terms?
5. Are the major steps sequenced according to task performance?

PROCEDURAL STEPS

1. Is each stated in action terms?
2. Do they provide a complete structure of the performance in each major step?
3. Are they sequenced according to performance?

PERFORMANCE OBJECTIVES

BEHAVIOR

1. Is the behavior stated with measurable action verbs?
2. Is the statement compatible with the action in the task statement?
3. Is the action verb accompanied by an object?
4. Has the statement been qualified, when necessary to specify:
   a. With what?
   b. To what degree?
   c. For what end product?

CONDITIONS

1. Are all necessary conditions included?
2. Are the conditions possible in all instructional settings?
3. Have clearly implied or obvious conditions (paper, pencil, etc.) been left out? When such items are clearly understood it is not usually necessary to write them into an objective.

STANDARDS

1. Does the standard represent the desired level of proficiency?
2. Is it realistic and attainable?
3. Does it set criteria for evaluation of the product whenever possible?
4. Does it eliminate subjectivity on the part of the evaluation?
5. Is it referenced, whenever possible, to a reliable published source?

CRITERION-REFERENCED MEASURES

1. Does it give clear, complete directions to the student?
2. Does it require performance of the same behavior specified in the performance objective?
3. Does it measure all behavior specified in the performance objective?
4. Is its terminology compatible with that of the performance objective?
5. Does it require the same conditions as specified in the performance objective?
6. Is it merely a copy of the performance objective? If so, rewrite.
7. Does it repeat the task analysis? If so, rewrite.

INSTRUCTOR CHECKLIST

1. Is a checklist essential? Could a more objective standard have been written to describe:
   a. Quality of finished product?
   b. Correctness of finished product?
   c. Accuracy of finished product?
   d. Content of finished product?
   e. Adjunct standards?
   f. Time limits for completion of product?
2. When included with a process, does it meet one or more of the following criteria?
   a. The services rendered by the task depends upon a series of equally important steps or acts.
   b. Acceptable performance depends upon quality of steps.
3. When checklist is used with a product, does it meet one or more of the following criteria?
   a. Steps of performance are critical
   b. Product of each step must be evaluated.
   c. Safety precaution must be observed and rated
4. Each checklist item for critical elements is a complete past tense statement which requires a **did/did not** rating.
5. Each item pertaining to product of a step is written as a complete past tense description for a **did/did not** rating.
6. Checklist is not a mere copy of the task analysis.